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AMSAT's® *Newsletter for the Amateur Radio Space Program*

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AMSAT OSCAR 10 Providing Communications Again

AMSAT OSCAR 10 is providing excellent communications despite the fundamental problems with the IHU memory. This is good news since it had been feared that poor sun angles would doom the spacecraft before the end of 1986. But thanks to the superb work of the command team and the cooperation of users world-wide, the risk of total loss of AO-10 is, for the present, reduced. The primary AO-10 command team comprises ZL1AOX, VK5AGR, VE1SAT, WØPN and DB2OS with several others acting as back-ups.

Meanwhile, questions have arisen regarding the attitude of AO-10. Since there has been no meaningful telemetry from AO-10 since last August, it has been impossible to calibrate the spacecraft attitude. Now, however, James Miller, G3RUH, has been able to estimate AO-10's attitude based on its last known attitude and an estimate of the effect of a couple of torquing sessions which occurred. James concludes the attitude in early January was 155 longitude and +15 latitude. AO-10 users with provisions for Bahn coordinates in their tracking software may want to enter these values and compare their observations with the estimated attitude and the signal characteristics presumed to result from the estimated squint angles.

Hans Van de Groenendahl, ZS6AKV (left) and Hennie Rheeder, ZS6ALN, address the P3C Mode S antenna project.

The Mode B transponder has been on continuously and providing excellent communications for satellite users around the world. According to controllers, the sun angle will be improving over the next few weeks.

Significantly, the IHU has been shut down. This means the Mode B transponder will remain on independent of IHU control. Thus, so long as power is carefully used, the Mode B transponder could remain on indefinitely.

Therefore, Mode B use is now encouraged under carefully controlled conditions. QRP use is essential. That means 100 watts ERP or less please. Operating is permitted from MA 21 through 219. Please QRT from MA 220 through 020.

The satellite is currently experiencing eclipses. According to N4HY, the eclipses in early February were about 35 minutes long. His new program yielded the following:

2/9/1987 7:59:38.5 duration is 35.7 minutes
eclipse begins at ma: 235.9
eclipse ends at ma: 249.0
2/9/1987 19:39:31.9 duration is 35.5 minutes
eclipse begins at ma: 236.1
eclipse ends at ma: 249.1

Surrey To Flip UoSAT OSCAR 11 In Experimental Maneuver

The UoSAT Operations Center at the University of Surrey in England has announced the initiation of a series of attitude maneuver experiments. According to Dr. Martin Sweeting, G3YJO, Director of the Surrey Satellite Engineering Establishment, they are in the process of carrying out some attitude maneuvers on UoSAT OSCAR 11 which involve the deliberate destabilization of the spacecraft and then re-stabilization the other way up. They have a series of algorithms running on the On-Board Computer (OBC) to achieve these maneuvers. The results can be observed by watching the Whole Orbit Data (WOD).

According to G3YJO, some of the initial maneuvers will require the OBC DIARY to be suspended periodically for

24-36 hours or so, but then the DIARY will be re-instated. G3YJO apologizes for any inconvenience that these activities may cause. DCE stations wishing to use the spacecraft may do so whenever the DIARY is in operation, but will not be accepted by UO-11 during DIARY down-time.

Martin adds that the UK has been experiencing some very cold weather (-30 degrees C) and a lot of snow (for England) and this has hampered operations — the station has performed perfectly. However, spacecraft operators have had difficulty in getting into UoS for evening ops due to deep snow!

Surrey hopes to finish these maneuvers this week. Martin invites comments on the movement of Keplerian data from UO-11 to UO-9 Bulletins — anyone like it or like it not?

Orlando Hamcation To Feature AMSAT Leaders and Members

AMSAT will sponsor a booth at the Orlando Hamcation March 13, 14 and 15. AMSAT's Vice President of Field Operations Mike Crisler, N4IFD, will lead the AMSAT delegation to the convention. An AMSAT forum will be held on March 14 from 1000 to 1200 hours. Later, from 1200 to 1400, a special thematic forum, "The Future of Amateur Radio" will be held. Panelists include ARRL's Executive Vice President Dave Sumner, K1ZZ, Publications Manager Paul Rinaldo, W4RI, as well as AMSAT's own Phase 4 Engineering Administrator Dick Jansson, WD4FAB.

AMSAT NA hopes to see many AMSAT members present and helping out at the booth. Contact N4IFD or WD4FAB for additional details.

Packet Radio Experiments In Remote Villages Promote PACSAT

by Hans Van De Groenendahl, ZS6AKV
SA AMSAT President

Packet radio and a PACSAT-type satellite are currently being considered as a possible answer in solving communications problems in the farming industry of the small Kingdom of Lesotho (7P8). A Canadian Radio Amateur, 7P8DL, (VE3NGH) now working in Lesotho on agricultural projects has already had discussions with Lesotho Government officials. It would, of course, be impractical for a small country like Lesotho to have its own satellite, but once PACSAT is a reality, Lesotho could well share the facilities with other Third-World countries. Lesotho is a small, very mountainous country where rural transport is by horse back and donkey cart.

George Hunt, 7P8DL, is currently setting up a satellite and HF station and will soon be demonstrating packet radio with the help of SA AMSAT members in ZS. The possibility of setting up an 80 meter packet link to show how effective packet radio is, is now under consideration and will most likely be operational after George returns from a visit to Canada in March.

AMSAT Looking At ASR Mailing Options

AMSAT NA is evaluating means of expediting *ASR* delivery to AMSAT NA members world-wide.

ASR is currently mailed to U.S. AMSAT NA members under a Second Class non-profit mailing permit. Typically it takes 2 to 3 weeks to reach the addressee. AMSAT NA would like to know how many members would want to receive *ASR* via First Class Mail if an extra-cost option for this were offered. It is estimated it will cost an additional $12 per year for domestic members to upgrade to First Class mailing. Those members interested in such an option to receive *ASR* more quickly but at added cost are invited to communicate their preferences to AMSAT HQ, P.O. Box 27, Washington, D.C. 20044.

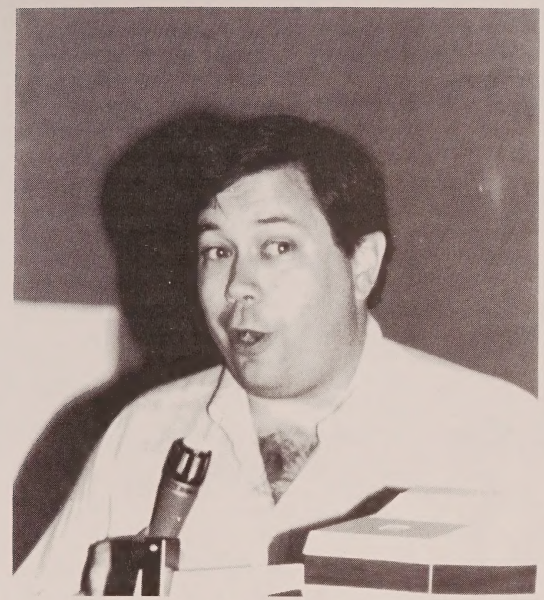
An overseas Air Mail option for AMSAT's previous publications had been offered in the past. AMSAT NA is now mailing *ASR* direct via Air Mail to overseas members who had previously opted for this expedited mode. Furthermore, AMSAT NA is now considering offering this overseas Air Mail option to any overseas members who wish to receive *ASR* direct via Air Mail as an extra-cost option. Watch for an announcement to this effect with estimated additional costs for this expedited overseas Air Mail service.

Short Bursts

• The launch of RS-9 and RS-10 is imminent according to usually reliable sources. At press time it was thought launch would come at any moment. RS-9 is thought to have a Mode A transponder and a robot aboard while RS-10 is believed to carry Modes A, K, T and a robot. Check *ASR* #140 for frequencies and monitor the AMSAT nets for the latest news on these new birds. The launch will take place, it is believed, piggyback with a Soviet navigational satellite from the major launch site at Pletsetsk.

• The Soviet Union is turning a new page in their highly successful manned space program. The launch of a Progress 2 cargo ship on 16 January was expected to precede by a couple of days the launch of 3 cosmonauts usually reliable

AMSAT President Emeritus Tom Clark, W3IWI, explains the new TAPR FO-12 modem project.



Gerry Creager, WB5FIV, spoke on a new packet satellite project concept.

sources indicate. The Progress cargo vehicle successfully docked with the Mir space Station on 18 January. At press time, the launch of the Cosmonauts was thought to be a day or two away. The Cosmonauts will stay approximately 10 months. However, according to the trade journal *Aviation Week & Space Technology*, the present manned space mission will mark the beginning of a permanent Soviet manned presence in space aboard Mir and the modules subsequently docked to it.

• JARL, the Japanese Amateur Radio League, is currently planning the launch of JAS-1B in 1989 according to reliable sources. Two satellites were built by JARL, JAMSAT and NEC. JAS-1A was launched by NASDA, the Japanese National Space Agency, last August to become known as Fuji OSCAR 12. JAS-1B is identical to its twin, JAS-1A.

• Launch of Phase 3C appears to be slipping to later in the year. The satellite is in very good condition but the launcher schedule continues in doubt. A new launch schedule is expected to be published by Arianespace next month. AMSAT is on the V21 mission, the first flight of the large Ariane-4 rocket.

• No new operating schedule for FO-12 has been announced. It is at present unclear what the intentions are regarding Mode JD in particular or the general operating schedule in general.

• It has been suggested that AMSAT should have an official QSL card. Those interested in an AMSAT QSL card should "vote" for the project by advising AMSAT HQ as soon as possible.

• SA AMSAT will be holding its annual Space Communications Conference in Johannesburg during the weekend of September 25 to 27, 1987. International delegates will be taken on a tour of the Kruger National Game Reserve prior to the conference and be able to operate satellites from the bush. More information is available from SA AMSAT, P.O.Box 13273, Northmead, South Africa 1511.

• RS-5 and RS-7 are both back in eclipses. Consequently, their operation will be highly sporadic and unpredictable. The batteries on both these veteran birds are virtually useless. The satellites are on, therefore, only when illuminated by the sun continuously or when in sunlight after a manual reset by the ground command station in Moscow. RS-5 emerges from its eclipse cycle on 28 March while RS-7 completes its cycle on 22 March.

• The long-lost RS-1 is being heard from again. Latest report is from W2LRJ who heard the characteristic "5015" anomalous telemetry on 29.402 MHz in early January. This satellite was launched on 26 October 1978. Its transponder ceased functioning in 1980 but occasionally, when warmed and illuminated by the sun, its telemetry transmitter springs to life with the meaningless telemetry garble "5015" repeated endlessly.

• MacSat is a general purpose satellite tracking program for use with the Apple Macintosh 512K or Mac Plus computers. The program has been designed to track up to 18 satellites simultaneously, either in simulation or real time mode. There is a text screen which displays satellite ground coordinates, range, and Doppler shift frequency information in tabulated form. A graphical screen portrays the satellite ground tracks superimposed on a world map. There is also a screen which displays the precise location of each visible satellite above the observer's horizon. The program is available for Canadian $ 39 from: Geodetic Research Laboratory, Department of Surveying Engineering, University of New Brunswick, Box 4400, Fredericton, New Brunswick, Canada E3B 5A3.

ORBIT PREDICTIONS

Satellite	**OSCAR-9**
Catalog number	12888
Epoch time:	87008.18206413
Thu Jan 8 04:22:10.340 1987 UTC	
Element set:	984
Inclination:	97.6540 deg
RA of node:	20.9026 deg
Eccentricity:	0.0003985
Arg of perigee:	72.3586 deg
Mean anomaly:	287.8083 deg
Mean motion:	15.29119921 rev/day
Decay rate:	8.64e-06 rev/day^2
Epoch rev:	29228
Semi major axis	6853.543 km
Anom period:	94.171816 min
Apogee:	497.206 km
Perigee:	491.743 km
Ref perigee:	3294.19517837
Thu Jan 8 04:41:03.411 1987 UTC	
Beacon:	145.8250 MHz

Satellite	**OSCAR-10**
Catalog number	14129
Epoch time:	87007.12185883
Wed Jan 7 02:55:28.602 1987 UTC	
Element set:	284
Inclination:	27.0981 deg
RA of node:	41.4725 deg
Eccentricity:	0.6028396
Arg of perigee:	174.4993 deg
Mean anomaly:	197.7328 deg
Mean motion:	2.05873942 rev/day
Decay rate:	-7.5e-07 rev/day^2
Epoch rev:	2684
Semi major axis	26103.932 km
Anom period:	699.457146 min
Apogee:	35462.312 km
Perigee:	3989.344 km
Ref perigee:	3293.34079973
Wed Jan 7 08:10:45.96 1987 UTC	
Translate freq	581.0047 MHz
Invert:	1
Beacon:	145.8090 MHz

Satellite	**OSCAR-11**
Catalog number	14781
Epoch time:	87008.62897954
Thu Jan 8 15:05:43.832 1987 UTC	
Element set:	197
Inclination:	98.1250 deg
RA of node:	77.4290 deg
Eccentricity:	0.0012231
Arg of perigee:	238.7716 deg
Mean anomaly:	121.2296 deg
Mean motion:	14.62098467 rev/day
Decay rate:	8.04e-05 rev/day^2
Epoch rev:	15238
Semi major axis	7061.618 km
Anom period:	98.488579 min
Apogee:	707.435 km
Perigee:	690.161 km
Ref perigee:	3294.60594765
Thu Jan 8 14:32:33.876 1987 UTC	
Beacon:	145.8260 MHz

Satellite	**OSCAR-12**
Catalog number	16909
Epoch time:	87007.45230995
Wed Jan 7 10:51:19.579 1987 UTC	
Element set:	27
Inclination:	50.0191 deg
RA of node:	159.4253 deg
Eccentricity:	0.0011078
Arg of perigee:	235.2837 deg
Mean anomaly:	124.6943 deg
Mean motion:	12.44393694 rev/day
Decay rate:	-2.5e-07 rev/day^2
Epoch rev:	1837
Semi major axis	7866.842 km
Anom period:	115.719005 min
Apogee:	1505.896 km
Perigee:	1488.466 km
Ref perigee:	3293.42447527
Wed Jan 7 10:11:14.662 1987 UTC	
Translate freq	581.8000 MHz
Invert:	1
Beacon:	435.7970 MHz

Satellite	noaa-9
Catalog number	15427
Epoch time:	86357.37187050
Tue Dec 23 08:55:29.611 1986 UTC	
Element set:	140
Inclination:	99.0253 deg
RA of node:	316.7567 deg
Eccentricity:	0.0015789
Arg of perigee:	344.6593 deg
Mean anomaly:	15.4096 deg
Mean motion:	14.11466742 rev/day
Decay rate:	8.5e-07 rev/day^2
Epoch rev:	10451
Semi major axis	7229.679 km
Anom period:	102.021532 min
Apogee:	864.409 km
Perigee:	841.579 km
Ref perigee:	3278.36883788
Tue Dec 23 08:51:07.592 1986 UTC	
Beacon:	137.6200 MHz

Satellite	noaa-10
Catalog number	16969
Epoch time:	87012.25905882
Mon Jan 12 06:13:02.682 1987 UTC	
Element set:	24
Inclination:	98.7386 deg
RA of node:	44.3114 deg
Eccentricity:	0.0013174
Arg of perigee:	301.8062 deg
Mean anomaly:	58.1830 deg
Mean motion:	14.22483969 rev/day
Decay rate:	3.9e-07 rev/day^2
Epoch rev:	1657
Semi major axis	7192.258 km
Anom period:	101.231369 min
Apogee:	838.676 km
Perigee:	819.726 km
Ref perigee:	3298.24769704
Mon Jan 12 05:56:41.24 1987 UTC	
Beacon:	137.5000 MHz

Satellite	mir
Catalog number	16609
Epoch time:	87012.92090102
Mon Jan 12 22:06:05.848 1987 UTC	
Element set:	442
Inclination:	51.6118 deg
RA of node:	233.4866 deg
Eccentricity:	0.0020508
Arg of perigee:	317.9474 deg
Mean anomaly:	42.0048 deg
Mean motion:	15.80332362 rev/day
Decay rate:	9.523e-05 rev/day^2
Epoch rev:	5161
Semi major axis	6708.156 km
Anom period:	91.120073 min
Apogee:	349.663 km
Perigee:	322.149 km
Ref perigee:	3298.91351776
Mon Jan 12 21:55:27.934 1987 UTC	
Beacon:	143.6250 MHz

Satellite	Salyut-7
Catalog number	13138
Epoch time:	87012.90433619
Mon Jan 12 21:42:14.646 1987 UTC	
Element set:	461
Inclination:	51.6135 deg
RA of node:	282.6639 deg
Eccentricity:	0.0001691
Arg of perigee:	62.5246 deg
Mean anomaly:	297.6087 deg
Mean motion:	15.30839384 rev/day
Decay rate:	4.3e-06 rev/day^2
Epoch rev:	27219
Semi major axis	6851.952 km
Anom period:	94.066041 min
Apogee:	485.308 km
Perigee:	482.991 km
Ref perigee:	3298.91565738
Mon Jan 12 21:58:32.797 1987 UTC	

Satellite	RS-5
Catalog number	12999
Epoch time:	87007.38076166
Wed Jan 7 09:08:17.807 1987 UTC	
Element set:	376
Inclination:	82.9573 deg
RA of node:	355.6791 deg
Eccentricity:	0.0009663
Arg of perigee:	350.6448 deg
Mean anomaly:	9.4292 deg
Mean motion:	12.05059099 rev/day
Decay rate:	1.2e-07 rev/day^2
Epoch rev:	22246
Semi major axis	8033.815 km
Anom period:	119.496214 min
Apogee:	1663.990 km
Perigee:	1648.464 km
Ref perigee:	3293.37858814
Wed Jan 7 09:05:10.15 1987 UTC	

Satellite	RS-7
Catalog number	13001
Epoch time:	87010.93568135
Sat Jan 10 22:27:22.868 1987 UTC	
Element set:	295
Inclination:	82.9608 deg
RA of node:	346.5691 deg
Eccentricity:	0.0020905
Arg of perigee:	254.8596 deg
Mean anomaly:	105.0156 deg
Mean motion:	12.08701170 rev/day
Decay rate:	1.3e-07 rev/day^2
Epoch rev:	22356
Semi major axis	8017.657 km
Anom period:	119.136147 min
Apogee:	1675.900 km
Perigee:	1642.378 km
Ref perigee:	3296.91154718
Sat Jan 10 21:52:37.676 1987 UTC	

Satellite	ajisai
Catalog number	16908
Epoch time:	86359.60469828
Thu Dec 25 14:30:45.931 1986 UTC	
Element set:	20
Inclination:	50.0084 deg
RA of node:	198.8843 deg
Eccentricity:	0.0011578
Arg of perigee:	202.7098 deg
Mean anomaly:	157.3223 deg
Mean motion:	12.44367957 rev/day
Decay rate:	-2.5e-07 rev/day^2
Epoch rev:	1678
Semi major axis	7866.952 km
Anom period:	115.721398 min
Apogee:	1499.786 km
Perigee:	1481.570 km
Ref perigee:	3280.56957954
Thu Dec 25 13:40:11.671 1986 UTC	

RS-5
Mon Feb 9 00:12:29.93 1987 UTC:
Ascending node at 163.8 west
Nodal period: 119.55264 min
Longitude increment:
30.015148 deg w/orbit
Element set 376, epoch:
Wed Jan 7 09:08:17.807 1987 UTC

RS-7
Mon Feb 9 01:43:16.112 1987 UTC:
Ascending node at 193.8 west
Nodal period: 119.19289 min
Longitude increment:
29.925125 deg w/orbit
Element set 295, epoch:
Sat Jan 10 22:27:22.868 1987 UTC

OSCAR-9
Mon Feb 9 01:12:22.298 1987 UTC:
Ascending node at 103.0 west
Nodal period: 94.22868 min
Longitude increment:
23.554280 deg w/orbit
Element set 984, epoch:
Thu Jan 8 04:22:10.340 1987 UTC

OSCAR-11
Mon Feb 9 00:51:09.701 1987 UTC:
Ascending node at 43.0 west
Nodal period: 98.51318 min
Longitude increment:
24.628388 deg w/orbit
Element set 197, epoch:
Thu Jan 8 15:05:43.832 1987 UTC

OSCAR-12
Mon Feb 9 01:26:36.88 1987 UTC:
Ascending node at 101.1 west
Nodal period: 115.65356 min
Longitude increment:
29.239392 deg w/orbit
Element set 27, epoch:
Wed Jan 7 10:51:19.579 1987 UTC

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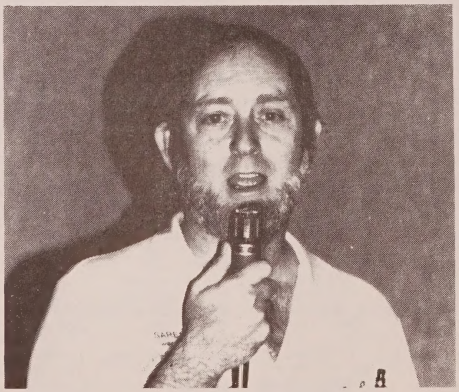

Lou McFadin, W5DID, of the Space Station Amateur Radio (SSAR) project.

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